

PRELIMINARY REMARKS

Claims 1, 3 to 6, 10 to 17 and 20 to 24 as set forth in Appendix I of this paper are herewith presented for further prosecution. Relative to the version of claims presented with applicants' paper of October 10, 2008, and as indicated in the Listing of Claims, applicants have canceled Claims 2 and 7 to 9, and have amended Claims 1, 12, 13, 16, 17, 20 and 21.

More specifically, applicants have amended Claim 1 to recite the features previously recited in Claims 2 and 7 to 9, and have adjusted the wording of Claim 16 accordingly. Claims 12 and 13 were amended to correct obvious errors, i.e., the reference to an >inlet angle  $\alpha$ < was corrected to refer to an "inlet angle  $\alpha$ " in Claim 12,<sup>2)</sup> and the reference to an >outlet angle  $\beta$ < was corrected to refer to an "outlet angle  $\beta$ " in Claim 13.<sup>3)</sup> Additionally, the dependence of Claims 17, 20 and 21 was corrected. No new matter has been added.

The Examiner rejected Claims 1 to 17 and 20 to 24 as presented with applicants' paper of October 10, 2008, taking the position

- a) that Claims 1 to 5, 7, 9, 15 to 17 and 20 to 24 were unpatentable under 35 U.S.C. §103(a) in light of the teaching of *Biglione et al.* (US 4,606,873) when taken in view of the disclosure of *Zimmermann et al.* (US 5,112,875);
- b) that Claim 6 was unpatentable under 35 U.S.C. §103(a) in light of the teaching of *Biglione et al.* when taken in view of the disclosures of *Zimmermann et al.* and *Carmody et al.* (US 3,673,126);
- c) that Claim 8 was unpatentable under 35 U.S.C. §103(a) in light of the teaching of *Biglione et al.* when taken in view of the disclosures of *Zimmermann et al.* and of *Cuff* (US 3,981,959); and
- d) that Claims 10 to 14 were unpatentable under 35 U.S.C. §103(a) in light of the teaching of *Biglione et al.* when taken in view of the disclosures of *Zimmermann et al.* and *Knaus* (US 5,605,937).

It is respectfully noted that Claim 1 which is the only independent claim presented herewith has been amended to include, i.e., the elements of previous claim 8. As such, issues (a), (b) and (d) of the final Office action are deemed to be obviated.<sup>4)</sup> Withdrawal of the respective rejections is respectfully solicited.

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2) Cf. page 5, indicated lines 8 and 9, of the application.

3) Cf. page 5, indicated lines 10 to 11, of the application.

4) If an independent claim is non-obvious under 35 U.S.C. §103, then any claim depending therefrom is non-obvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

It is further respectfully requested that the Examiner favorably reconsider the position that the subject matter of Claim 8, or Claims 1, 3 to 6, 10 to 17 and 20 to 24 as presented herewith, is unpatentable under 35 U.S.C. §103(a) in light of the teaching of *Biglione et al.* (US 4,606,873) when taken in view of the disclosures of *Zimmermann et al.* (US 5,112,875) and of *Cuff* (US 3,981,959).

*“Under §103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented.”*<sup>5)</sup> While the Supreme Court confirmed that the analysis under 35 U.S.C. §103 *“need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ,”*<sup>6)</sup> the Supreme Court, however, also cautioned that *“rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.”*<sup>7)</sup> Notably, the Supreme Court emphasized the need *“to determine whether there was an apparent reason to combine known elements in the fashion claimed by the patent at issue.”*<sup>8)</sup> To establish a prima facie case of obviousness it is, therefore, essential that there be some motivation or suggestion to make the claimed invention in light of the prior art teachings.<sup>9)</sup> *“[A] proper analysis under §103 requires, inter alia, consideration of ... whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process.”*<sup>10)</sup> Moreover:<sup>11)</sup>

*It is impermissible within the framework of section 103 to pick and choose from any one*

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5) *Graham v. John Deere*, 383 U.S. 1, at 17 – 18, 148 USPQ 459 (1966). Cf. *KSR Int’l v. Teleflex, Inc.*, 550 U.S. \_\_\_\_ (2007), Slip op. at 2.

6) *KSR Int’l v. Teleflex Inc.*, 127 S.Ct. 1727, \_\_\_, 82 USPQ2d 1385, 1397 (2007); emphasis added.

7) *KSR Int’l v. Teleflex, Inc.*, 127 S.Ct. at \_\_\_, 82 USPQ2d at 1396 (quoting *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006)); emphasis added.

8) *KSR Int’l v. Teleflex, Inc.*, 550 U.S. \_\_\_\_ (2007), Slip op. at 14.

9) See, e.g., *In re Brouwer*, 77 F.3d 422, 425, 37 USPQ2d 1663, 1666 (Fed. Cir. 1996) (“[T]he mere possibility that one of the esters or the active methylene group-containing compounds . . . could be modified or replaced such that its use would lead to the specific sulfoalkylated resin recited in claim 8 does not make the process recited in claim 8 obvious “unless the prior art suggested the desirability of [such a] modification” or replacement.”) (quoting *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984)).

10) *In re Vaeck*, 947 F.2d 488, 493, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991).

11) Cf. *In re Wesslau*, 353 F.2d 238, 241, 147 USPQ 391, 393 (CCPA 1965); see also *In re Mercer*, 515 F.2d 1161, 185 USPQ 774, (CCPA 1975); *Bausch & Lomb v. Barnes-Hind/Hydrocurve*, 796 F.2d 443, 230 USPQ 416 (Fed. Cir. 1986).

*reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art.*

It is respectfully urged that the teaching of *Biglione et al.* taken in view of the disclosures of *Zimmermann et al.* and of *Cuff* cannot be deemed to render applicants' invention as a whole *prima facie* obvious when the references are properly evaluated for what they fairly suggested to a person having ordinary skill in the pertinent technology at the time of applicants' invention. Further, once the references are duly evaluated for what they fairly suggested at the pertinent time, the Examiner's reasoning cannot be deemed to have the rational underpinning which is necessary to support a conclusion of obviousness.

The Examiner argued that it would have been obvious to a person of ordinary skill in the pertinent art to employ "*the polystyrene polymer with molecular weight of about 180,000 to about 300,000 g/mol as taught by ZIMMERMANN et al. in the process of preparing expandable polystyrene polymers as taught by BIGLIONE et al. in order to produce polystyrene granules from expandable styrene polymers with high degree of expandability due to the use of low level blowing or foaming agents used to make articles like seat cushions.*"<sup>12)</sup>

However, a person of ordinary skill in the pertinent art who contemplates the disclosure of *Zimmermann et al.* together with the teaching of *Biglione et al.* readily appreciates that the procedure which is described in the secondary reference yields expandable polystyrene beads, i.e., polystyrene beads which already include appropriate amounts of (*low level foaming or*) blowing agent, and that the polystyrene beads which are obtained in accordance with the procedure of *Zimmermann et al.* can be readily expanded and processed to form moldings such as seat cushions.<sup>13)</sup> In fact, the procedure which is disclosed by *Zimmermann et al.* falls within the realm of art which is addressed by *Biglione et al.* in col. 1, indicated lines 29 to 46. *Biglione et al.* state in the respective section with regard to the suspension polymerization procedure such as, for example, described by *Zimmermann et al.*, that the procedure yields expandable beads of good quality which are well suited for the use in important fields such as the building, refrigeration, and packaging fields. Also notably, *Biglione et al.* specifically state that the expandable granules which are obtained in accordance with the taught extrusion process "*are, from the point of view of their behavior in the subsequent operations of expansion and shape molding, similar to the well known expandable beads obtained by incorporating the expanding agent during the polymerization process in suspension.*"<sup>14)</sup>

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12) Cf. final Office action page 3, line 18, to page 4, line 2.

13) Cf., e.g., Examples 1 and 2, col. 9, indicated line 32, to col. 10, indicated line 39, of *US 5,112,875*.

14) Cf., col. 3, indicated lines 22 to 27, of *US 4,606,873*.

It is deemed to be immediately evident that a person of ordinary skill in the pertinent art had no apparent reason whatsoever to employ the already expandable polystyrene beads which are obtained in accordance with the the suspension polymerization of *Zimmermann et al.* in the process of *Biglione et al.* Again, the polystyrene beads of *Zimmermann et al.* already comprise appropriate amounts of (*low level foaming or*) blowing agent, i.e., are already well suited for the manufacture of moldings such as seat cushions. Also, in accordance with the statements of *Biglione et al.*, the respective beads are similar in their behavior in the subsequent utilization. The Examiner's argument that a person of ordinary skill would have employed *Zimmermann et al.*'s expandable polystyrene beads in the process of *Biglione et al.* "*in order to produce polystyrene granules from expandable styrene polymers with high degree of expandability*" is therefore deemed to lack the rational underpinning which is required to support a conclusion of obviousness.

The Examiner commented on the foregoing argument in the Advisory action urging that the "*selection of an appropriate molecular weight for use in the Biglione process would have been obvious since the claimed molecular weights are already known from Zimmermann for a similar foamable material.*"<sup>15)</sup> Applicants respectfully beg to differ. As reflected in the Discussion of Related Art of *US 2008/0203597 A1* (*Rogov et al.*, listed in IDS accompanying this RCE), the art continues to consider the extrusion based method of manufacturing expandable polystyrene beads to be limited to particular polystyrenes and to pose stringent requirements on the polystyrene.<sup>16)</sup> Although the reference itself post-dates applicants' invention, the respective explanations are made in reflection of the background knowledge of a person having ordinary skill in the pertinent art not only at the time *Rogov et al.* filed their application but also at the time applicants made their invention. Similarly, the statements made in paras. [0011] to [0012] of *Rogov et al.* confirm that it was known in the pertinent technology that an extrusion process similar to that taught by *Biglione et al.* for the manufacture of expandable beads inter alia has the disadvantage that it requires "*the use of polystyrene with a molecular weight (Mw) of less than 200'000, or of 90'000 to 150'000 to be exact, and with the melt flow index of the melt of 4.5 to 5.0.*"

The referenced explanations corroborate that, at the time applicants made the invention, a person of ordinary skill in the pertinent art could not reasonably expect that the process of *Biglione et al.* could be conducted successfully with styrenes having any and all molecular weights, or that polystyrenes of any and all molecular weights would be suited for the process of *Biglione et al.* merely because expandable polystyrene beads of such polystyrenes obtained in a suspension polymerization process were known. The Examiner's reasoning why a person of ordinary skill would have combined the teaching of *Biglione et al.* and the disclosure of *Zimmermann et al.* is therefore

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15) Advisory action page 2, lines 19 to 21.

16) Cf., e.g., paras. [0006] and [0007], as well as [0011] to [0014], of *US 2008/0203597*.

deemed to lack the rational underpinning which is necessary to support a conclusion of obviousness.

Acknowledging that the teaching of *Biglione et al.* and the disclosure of *Zimmermann et al.* failed to suggest or imply that the die plate be heated to a certain temperature above the temperature of the blowing agent-containing polymer melt as is required in accordance with applicants' claims,<sup>17)</sup> the Examiner asserted that such a measure would have been obvious to one of ordinary skill in light of the disclosure of *Cuff* which allegedly "*provides a device and process which the ordinary artisan would have recognized as within the scope of BIGLIONE's suggestion to adjust the temperature to avoid solidification within the extrusion holes.*"<sup>18)</sup>

*Cuff* describes an apparatus for pelletizing synthetic plastic resins which apparatus *inter alia* comprises an adaptor (52) and a die (38). Illustratively, *Cuff* further describes the pelletizing of polypropylene and mentions in that context:

*As the polypropylene emerges from the extruder it is preferably at a temperature of approximately 425°F. (The adaptor 52 will have been heated by the flow of heating oil or other medium at a temperature of 475°–500°F. through suitable manifolds in the adaptor.) After the viscous plastic reaches manifold 58, extrusion is continued until the plastic enters the extrusion bores 82, and passes through the extrusion sleeves 110, and emerges from the die face 154 of the apparatus. The die 38 is maintained in heated condition by the passage of the heating oil through the manifolds 80.*

However, the described apparatus and the mentioned procedure clearly pertain to the pelletizing of thermoplastics which do not comprise any blowing agent. The same holds true where the disclosure of *Guill* (US 3,029,466)<sup>19)</sup> is concerned which describes the utilization of a liquid phase pelletizer for pelletizing polyethylene resin which is free of blowing agent.<sup>20)</sup>

A person of ordinary skill in the pertinent technology readily distinguishes between a blowing agent-containing polymer melt which is processed in accordance with the teaching of *Biglione et al.* and blowing agent-free polymer melts such as processed in accordance with the disclosures of *Cuff* and *Guill*. It is well known and readily apparent that the conditions which are employed when blowing agent-free polymer melts are pelletized are primarily limited by the decomposition temperature of the respective resin. However, in the case of a blowing agent-containing polymer melt as is employed in accordance with *Biglione et al.*'s process, it is *inter alia* of concern that the extruded polymer granules remain expandable, i.e., that the pellets or granules do not expand pre-

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17) Final Office action page 7, lines 8 and 9.

18) Final Office action page 7, line 19, to page 8, line 2.

19) Final Office action page 10, line 20, to page 11, line 21.

20) E.g., col. 2, indicated lines 52 to 29, of US 3,029,466.

maturely. *Biglione et al.* briefly mentions the problematic of undesirable premature expansion of the material, for example, in col. 2, indicated lines 20 to 24 (*emphasis added*):

*In order to eliminate them [orientations and stresses], on the contrary, it should be necessary to work at a temperature higher than the Tg of the polymer and to cool slowly. This process, however, involves the risk of the non-desired expansion of the material.*

and in col. 3, indicated lines 16 to 20 (*emphasis added*):

*These conditions are essential both to avoid a beginning expansion of the granules and to reduce to a minimum the formation in said granules of orientation, stresses and/or internal holes caused by quenching.*

The process of *Biglione et al.* not only employs temperatures which are higher than the Tg of the polymer, but also involves slowly cooling the polymer melt. More specifically, *Biglione et al.* extrude the blowing agent-containing polymer at a temperature which is higher than the Tg of the polymer,<sup>21)</sup> i.e., under conditions which already bear the distinct risk of undesirable, premature expansion. It is deemed to be immediately evident that a person having ordinary skill in the pertinent art, therefore, would not reasonably be motivated to further increase the risk of undesirable, premature expansion of the granules by heating the die plate to an even higher temperature, e.g., a temperature in the range of from 20 to 100°C above the temperature of the blowing agent-containing polymer melt as is required in accordance with applicants' invention.

While *Cuff* and/or *Guill* may support that heating a die plate is conventional in the art of pelletizing blowing agent-free thermoplastic material, the references are deemed to be unsuited to suggest or imply that the respective technique can be employed successfully in the context of the extrusion of a blowing agent-containing polymer melt such as the process of *Biglione et al.*

The Examiner addressed the foregoing argument in the Advisory action arguing that *Biglione et al.*'s explanations in col. 3, indicated lines 30 to 35, specifically suggested that solidification and obstruction of the polymer in the extrusion holes should be avoided, and that this may require an elevated temperature. However, as stated by *Biglione et al.* in the referenced section: "*To avoid phenomena of solidification or obstruction of the polymers in the extrusion holes, the extrusion temperature is always kept at a value much higher than the softening one.*"<sup>22)</sup> The reference then goes on to explain how to adjust the respective extrusion temperature depending on the size of the die-head holes and the temperature of the water into which the extruded polymer is pressed. Accordingly, *Biglione et al.*'s teaching already provides for means by which phenomena of solidification or obstruction of the polymers in the extrusion holes are avoided.

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21) E.g., col. 3, indicated lines 31 to 35, of *US 4,606,873*.

22) Advisory action page 4, lines 7 to 9.

Noting that both the processes of *Biglione et al.* and *Cuff* employ an underwater pelletizer in which water flows over the die face while the polymer is extruded and cut, the Examiner took the position: *“It is this cooling water which avoids pre-expansion of the granules, despite the variation in temperatures which may be used in the extrusion process of Biglione. ... Any alleged distinct risk of undesirable, premature expansion is mitigated by Biglione’s use of cooling water flowing over the die face in the underwater pelletizer. The ordinary artisan recognizes that this cooling medium counteracts increases in the temperature of the extruded polymer and the die face.”*<sup>23)</sup>

Applicants respectfully disagree with the Examiner’s assertion that a person of ordinary skill in the pertinent art could reasonably expect measures known to be suitable in the extrusion of blowing agent-free thermoplastic material to be equally applicable in the extrusion of blowing agent-containing polystyrene. On the one hand, the Examiner’s attention is respectfully drawn to the explanations provided in paragraph [0013] of *EP 1 666 222*: *“The melt viscosity of the resin becomes significantly lower when a blowing agent is present therein, and thus suggestions for resin viscosity and shearing speed disclosed in Documents 3 and 4, which are technologies in which the resin is extruded without impregnating a blowing agent, cannot serve as references when extruding expandable granules.”* It ought to be borne in mind in this context, also, that *Biglione et al.* teach a careful control of the temperature of the cooling water to avoid that stresses and orientations in the granules are caused.<sup>24)</sup> Therefore, the Examiner’s approach to avoid problems which arise due to a pre-expansion of the particles by increasing the temperature gradient between the cooling water and the extruded blowing agent containing polystyrene is deemed to be fraught with risks regarding the usefulness of the resulting particles and is deemed to lack the necessary reasonable expectation of success.

In addition to the foregoing, at the time applicants made their invention the pertinent art was well aware that the use of a heated die plate in the extrusion of a blowing agent containing polystyrene had a deleterious impact on the quality of the resulting particles, and that particles thus obtained were ill suited for their intended purpose. *“[S]ince the temperature of the melting resin also becomes high in connection with this, it will foam a little and will become a shape of flat, cylinder-like particle. Moreover, cooling of melting resin will become inadequate in the die outlet section, and it will foam, or since the resin breathed out from a nozzle is flexible, cutting ... will ... [affect] the resin particle and ... [result in] flat like resin particle[s] which have a mustache-like projection[s] rather than will be good. ...”*<sup>25)</sup>

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23) Advisory action page 4, line 18, to page 5, indicated line 4.

24) Cf. col. 2, indicated lines 3 to 8, of *US 4,606,873*.

25) Para. [0006] of *JP 06/031726* (translation of record); cf. also para. [0010] and the results compiled in Table 1 of the reference.

Again, it is well known in the pertinent art that the temperature of the cooling water has to be adjusted in such a manner that orientations and stresses which are caused by quenching are avoided since such orientations and stresses have a detrimental effect on the uniformity of the cellular structure of the expandable particles and on the performance of the expanded product.<sup>26)</sup> Accordingly, the temperature of the cooling water is not per se suited to avoid pre-expansion as the Examiner would have it where blowing agent containing material is extruded to obtain useful expandable beads.

In light of the risks of premature and undesirable expansion of the extruded blowing agent-containing polymer melt which is mentioned by *Biglione et al.*, a person of ordinary skill in the art would have been discouraged from heating the die plate rather than being motivated to do so, especially since *JP 06/031726* documents the negative impact which a heated die plate has on the quality of the expandable beads that are obtained by an extrusion process as, e.g., taught by *Biglione et al.*

As shown in the foregoing, the Examiner's reasoning why a person of ordinary skill in the pertinent art would have been motivated to employ a polystyrene having the molecular weight disclosed by *Zimmermann et al.* in the extrusion process of *Biglione et al.* lacks the necessary rational underpinning because it was well appreciated in the pertinent technology that the extrusion process required the use of particular styrenes having a molecular weight which is below the molecular weight ( $M_w$ ) addressed by *Zimmermann et al.* and below the molecular weight ( $M_w$ ) which is required in accordance with applicants' invention. Moreover, the foregoing shows that the Examiner's reasoning why a person of ordinary skill in the pertinent art would have been motivated to increase the temperature of the die plate in the process of *Biglione et al.* on the basis of the disclosure of *Cuff* lacks the necessary rational underpinning because it was well appreciated in the pertinent technology that doing so resulted in pre-expanded and deformed particles of poor quality. As such, the Examiner's arguments and the referenced art cannot be deemed to support a conclusion that the subject matter of applicants' claims was obvious and is unpatentable under the provisions of Section 103(a). In particular, there was clearly no apparent reason for a person having ordinary skill in the pertinent technology to combine the teaching of *Biglione et al.* with the disclosures of *Zimmermann et al.* and/or of *Cuff* in the manner necessary to arrive at the subject matter of applicants' claims.

It is therefore respectfully urged that the subject matter of applicants' Claims 1, 3 to 6, 10 to 17 and 20 to 24 as presented with this paper is patentable under the provisions of Section 103(a), and favorable action is respectfully solicited.

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26) See col. 2, indicated lines 3 to 8, of *US 4,606,873*.



Further and for completeness sake it is respectfully noted that applicants are under no obligation to submit evidence of nonobviousness since the references fail to establish a prima facie case of obviousness when the level of ordinary skill in the pertinent art is properly resolved.<sup>27)</sup> As such, the Examiner's criticism expressed in the Advisory action on page 5, lines 9 to 14, regarding applicants' showing of pertinent results and properties which is contained in the application cannot be deemed to be pertinent. The Examiner, e.g., stated: "*It cannot be discerned from the table alone whether the blowing agent was the same, and used in the same amount in each case. Thus, since the relevant conditions are not described, it cannot be determined if this constitutes evidence pointing towards nonobviousness.*" In response it is respectfully noted that, while the table itself may lack a particular mention of the nature and amount of the blowing agent, applicants clearly state on page 6, indicated lines 30 to 34, of the application:

*Unless otherwise stated in the examples, the examples were carried out using a blowing agent containing polystyrene melt comprising PS 158 K from BASF Aktiengesellschaft having a viscosity number VN of 98 ml/g ( $M_w = 280,000$  g/mol, polydispersity  $M_w/M_n = 3.0$ ) and 6% by weight of n-pentane.*

As such, the relevant conditions of the investigations described in the application are provided in the application, and the Examiner's criticism is deemed to be unwarranted.

In light of the foregoing and the attached, the subject matter defined in in applicants' claims is deemed to be patentable under the pertinent provisions, and the application meets the requirements relating to the form or contents which are applicable in the present case. Allowance of the application is deemed equitable and is respectfully solicited.

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27) Cf. MPEP §2142, page 2100-127, Rev. 6, Sept. 2007.